TEST TWO

31. $\dfrac{d}{dx}\left(\dfrac{x-1}{x^2}\right) =$ **(A)** $\dfrac{1}{2x}$ **(B)** $\dfrac{1}{x^4}$ **(C)** $\dfrac{1}{x^2}$ **(D)** $\dfrac{2-x}{x^3}$ **(E)** $\dfrac{x^2-2x}{x^4}$

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32. $\dfrac{d}{dx}\left(1-x^2\right)^{1/2} =$ **(A)** $-2x\left(1-x^2\right)^{1/2}$ **(B)** $\dfrac{1}{2}(2x)^{-1/2}$

(C) $-x\left(1-x^2\right)^{-1/2}$ **(D)** $\dfrac{1}{2}\left(1-x^2\right)^{-1/2}$ **(E)** $\dfrac{2}{3}\left(1-x^2\right)^{3/2}$

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33. If $y = x^5 + x - \dfrac{1}{x}$, then $\dfrac{d^2y}{dx^2} =$ **(A)** $5x^4 + 1 + \dfrac{1}{x^2}$ **(B)** $20x^3 - \dfrac{2}{x^3}$

(C) $20x^3 - \dfrac{1}{x^3}$ **(D)** $5x^4 + \dfrac{2}{x^3}$ **(E)** $20x^3 + \dfrac{1}{x^3}$

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34. $\dfrac{d}{dx}\left(e^{-2x}\cos x\right) =$ **(A)** $e^{-2x}(2\cos x + \sin x)$ **(B)** $e^{-2x}(-2\cos x - \sin x)$

(C) $2e^{-2x}\sin x$ **(D)** $-2e^{-2x}\sin x$ **(E)** NOP

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35. If n is a positive integer,then $\dfrac{d}{dx}\displaystyle\int_0^x t^n\,dt=$

(A) x^n **(B)** $\dfrac{x^{n+1}}{n+1}$ **(C)** nx^{n-1} **(D)** 0 **(E)** NOP

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36. $\displaystyle\lim_{h\to 0}\frac{\sqrt{4+h}-2}{h} =$ **(A)** 2 **(B)** 1 **(C)** 1/2 **(D)** 0 **(E)** NOP

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37. $\displaystyle\int_{-1}^{1}\left(x^2+1\right)dx =$ **(A)** 0 **(B)** 4/3 **(C)** 8/3 **(D)** 2 **(E)** 4

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38. $\displaystyle\int_0^{\pi/6}\cos(3x)\,dx$ **(A)** $-1/3$ **(B)** 1/3 **(C)** -1 **(D)** 1 **(E)** NOP

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39. A particle moves along the x-axis so that at any time $t \geq 0$ the position of the particle is given by $x(t) = t^2 - 4t + 3$. The velocity and the acceleration of the particle become numerically equal at $t =$

(A) 0 **(B)** 1 **(C)** 2 **(D)** 3 **(E)** 4

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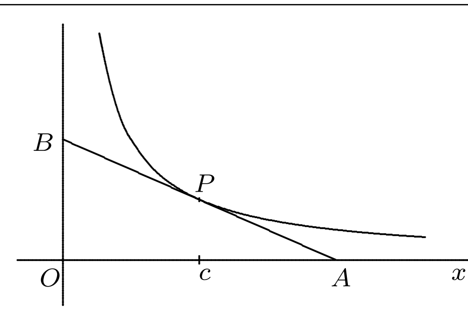
40. The point $P = \left(c, \dfrac{1}{c}\right)$ lies on the graph of $y = \dfrac{1}{x}$, and the tangent line at P meets the coordinate axes at points A and B as shown in the figure. The area of triangle AOB is



(A) 2 **(B)** $2c$ **(C)** $(1/2)c$ **(D)** $(1/2)c^2$ **(E)** $c\ln(c)$

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41. $\displaystyle\int_{-1}^{2}|x|\,dx =$ **(A)** 1/2 **(B)** 1 **(C)** 3/2 **(D)** 2 **(E)** 5/2

42. If $f'(x) < 0$ for $1 \le x \le 4$, then for those values of x, f attains a maximum value at

(A) $x = 1$ **(B)** $x = 4$ **(C)** no point **(D)** every point **(E)** NOP

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43. If $\dfrac{dy}{dx} = (x+1)(x-2)$, then where does y stop increasing and start decreasing?

(A) $x = 0$ **(B)** $x = 1$ **(C)** $x = -1$ **(D)** $x = 2$ **(E)** $x = -2$

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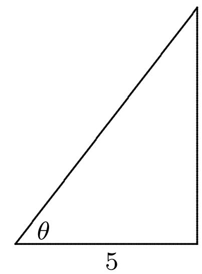
44. The right triangle shown here has a fixed horizontal leg of length 5, but the vertical leg is increasing in length at the rate of 2 feet per hour. How fast in radians per hour is the base angle θ increasing at the instant when the vertical leg measures 12 feet?

(A) 10/169 **(B)** 1/13 **(C)** 25/169 **(D)** 5/13 **(E)** NOP



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45. If $y = mx + b$ is the line tangent to the graph of $y = x^3 - 2x^2 + 3$ at the point $(1, 2)$, then the value of m is **(A)** -4 **(B)** -1 **(C)** 0 **(D)** 1 **(E)** 4

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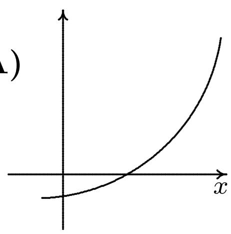
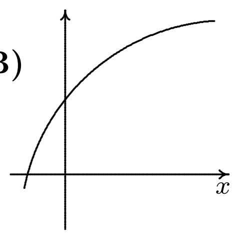
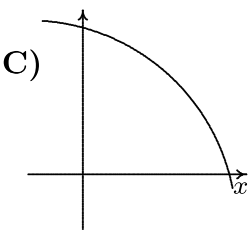
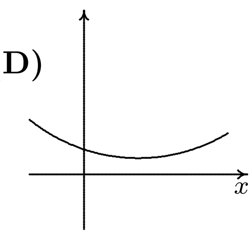
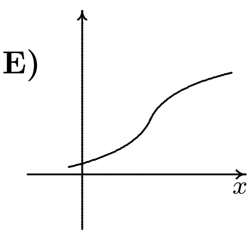
46. If y is a function of x such that $y' \ge 0$ for all x and $y'' \le 0$ for all x, then which of the following could be part of the graph of the function?

(A)


(B)


(C)


(D)


(E)


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47. A car moving at the speed of 90 feet per second is stopped by applying the brakes through a distance of 200 feet. If the acceleration K ft/sec^2 was constant during the entire time of braking then the value of K is **(A)** -19.25 **(B)** -20.25 **(C)** -21.25 **(D)** -22.25 **(E)** -23.25

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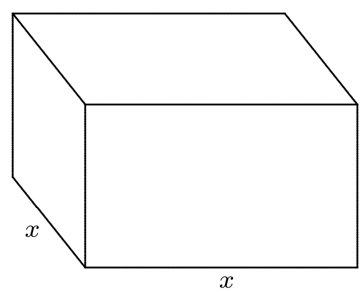
48. A rectangular box with square top and bottom is to be constructed. Its volume must be 12 cubic feet. The top and bottom will be made of material costng \$4 per square foot; material for the sides costs \$2 per square foot. To find the minimum cost of material for the box, we differentiate the function



(A) $16x^2$ **(B)** $\dfrac{24}{x} + x^2$ **(C)** $\dfrac{48}{x} + 2x^2$ **(D)** $\dfrac{96}{x} + 8x^2$ **(E)** $\dfrac{192}{x} + 4x^2$

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49. If $\displaystyle\int_a^b \frac{1}{x\ln(x)}\,dx$ is changed by means of a substitution, a possible result is

(A) $\displaystyle\int_{\ln a}^{\ln b} \frac{1}{u}\,du$ **(B)** $\displaystyle\int_{e^a}^{e^b} \frac{1}{u}\,du$ **(C)** $\displaystyle\int_{1/a}^{1/b} u\,du$ **(D)** $\displaystyle\int_a^b \frac{e^u}{u}\,du$ **(E)** $\displaystyle\int_{e^a}^{e^b} \frac{1}{\ln u}\,du$

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50. If $\dfrac{dy}{dt} = 4t^3$ and if $y(1) = 5$, then $y(2) =$ **(A)** 12 **(B)** 16 **(C)** 20 **(D)** 41 **(E)** 48