CALCULUS I – Worksheet #43

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1. The volume of the solid that results when the area between the curve $y = e^x$ and the line $y = 0$, from $x = 1$ to $x = 2$, revolved around the line $x = 1$ is given by (use shells)

   A) $2\pi \int_0^1 xe^x\,dx$ B) $2\pi \int_1^2 (1x)e^x dx$ C) $2\pi \int_0^2 (1-x)e^x\,dx$

   D) $2\pi \int_1^2 xe^x\,dx$ E) $2\pi \int_0^1 (x-1)e^x\,dx$

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2. The graph of $f(x) = \sqrt{11 + x^2}$ has a point of inflection at

   A) $(0,\sqrt{11})$ B) $(-\sqrt{11}, 0)$ C) $(0, -\sqrt{11})$

   D) $\left(\sqrt{\frac{11}{2}}, \sqrt{\frac{33}{2}}\right)$ E) There is no point of inflection

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3. A rectangle is to be inscribed between the parabola $y = 4 - x^2$ and the x-axis, with its base on the x-axis. A value of x that maximizes the area of the rectangle is:

   A) 0 B) $\frac{2}{\sqrt{3}}$ C) $\frac{2}{3}$ D) $\frac{4}{3}$ E) $\frac{\sqrt{3}}{2}$

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4. $\frac{d}{dw}\int_3^w \sin w\,dw$ =

   A) $\cos w - \cos 3$ B) $-\cos w + \cos 3$ C) $-\cos w$ D) $\cos w$ E) $\sin w$

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5. The region bounded by $y = x^{1/3}$, $x = 0$, $x = 1$, and the x – axis is revolved about the y – axis. In terms of cubis units, what is the volume of the solid generated? (use shells)

   A) $\frac{6\pi}{7}$ B) $\frac{3\pi}{4}$ C) 2π D) $\frac{4\pi}{3}$ E) π

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6. For what values of k will the graph of $y = x^3 + kx^2 + x + 2$ have two horizontal tangent lines?

   A) $k = 3$ only B) $-3 < k < 3$ C) $k > 3$ or $k < -3$ D) $k > \sqrt{3}$ or $k < -\sqrt{3}$ E) $0 < k < 3$

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7. The minimum value of the slope of the curve $y = x^5 + x^3 - 2x$ is A) 0 B) 2 C) 6 D) –2 E) none

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8. The function $f(x) = x^4 - 4x^2$ has

   A) one relative minimum and two relative maxima
   B) one relative minimum adn one relative maximum
   C) two relative maxima and no relative minimum
   D) two relative minima and no relative maximum
   E) two relative minima and one relative maximum

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9. Which statement below is true about the curve $y = \dfrac{x^2 + 4}{2 + 7x - 4x^2}$?

A) The line $x = -\dfrac{1}{4}$ is a vertical asymptote

B) The line $x = 1$ is a vertical asypmtote

C) The line $y = \dfrac{1}{4}$ is a horizontal asymptote

D) The graph has no vertical or horizontal asymptotes

E) The line $y = 2$ is a horizontal asymptote

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10. $\sum_{n=1}^{5} (2n + 3) =$

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11. Find ${}_9P_6$ and ${}_9C_6$.

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12. The base of a solid is the region bounded be $y = e^{-x}$, the x-axis, the y-axis, and the line $x = 1$. Each cross-section perpendicular to the x-axis is a square. The volume of the solid is

A) $\dfrac{e^2}{2}$ B) $e^2 - 1$ C) $1 - \dfrac{1}{e^2}$ D) $\dfrac{e^2 - 1}{2}$ E) $\dfrac{1}{2}\left(1 - \dfrac{1}{e^2}\right)$
