This print-out should have 7 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001   10.0 points

Find the slope of the tangent line to the graph of
$$r = e^\theta - 8$$
at $\theta = \pi/4$.

1. slope $= \dfrac{1}{e^{\pi/4} - 1}$

2. slope $= \dfrac{1}{4}e^{\pi/4} - 1$

3. slope $= e^{\pi/4}$

4. slope $= \dfrac{1}{4}e^{-\pi/4}$

5. slope $= \dfrac{1}{4}e^{\pi/4} + 1$

6. slope $= \dfrac{1}{e^{\pi/4} + 1}$

002   10.0 points

Find the slope of the tangent line to the graph of
$$r = 3 + \sin\theta$$
at $\theta = \pi/6$.

1. slope $= -\dfrac{1}{2}\sqrt{3}$

2. slope $= -\dfrac{1}{3}\sqrt{3}$

3. slope $= -\dfrac{3\sqrt{3}+1}{3+\sqrt{3}}$

4. slope $= -2\sqrt{3}$

5. slope $= \dfrac{3\sqrt{3}-1}{\sqrt{3}-3}$

6. slope $= \dfrac{3\sqrt{3}-1}{3+\sqrt{3}}$

003   10.0 points

Find an equation for the tangent line to the graph of
$$r = 4\cos\theta - 3\sin\theta$$
at $\theta = \pi/4$.

1. $y = \dfrac{4}{3}x - \dfrac{1}{8}$

2. $y = \dfrac{3}{4}x + \dfrac{1}{4}$

3. $y = \dfrac{4}{3}x + \dfrac{1}{4}$

4. $y = \dfrac{3}{4}x + \dfrac{1}{8}$

5. $y = \dfrac{3}{4}x - \dfrac{1}{8}$

6. $y = \dfrac{4}{3}x + \dfrac{1}{8}$

004   10.0 points

Find the y-intercept of the tangent line to the graph of
$$r = 3e^{-\theta} - 4$$
at the point P corresponding to $\theta = 0$.

1. y-intercept $= 0$

2. y-intercept $= \dfrac{2}{3}$

3. y-intercept $= -\dfrac{1}{3}$

4. y-intercept $= \dfrac{1}{3}$

5. y-intercept $= 1$

005   10.0 points
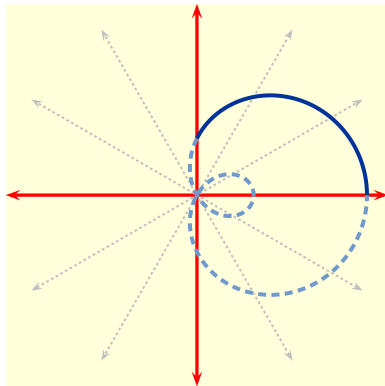
Find the length of the curve defined by:
$r = \sin\theta$ for , $0 \le \theta \le \pi$.

1. 0

2. 2π

3. π

4. 4π

5. $\pi/2$

006　10.0 points

Which one of the following integrals gives the arc length of the portion shown as solid blue in the graph
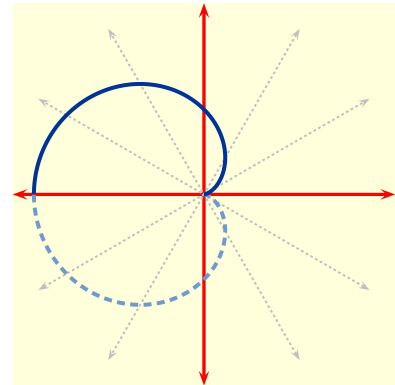

of the polar curve

$$r \;=\; 1 + 2\cos\theta\,.$$

1. $\dfrac{1}{2}\displaystyle\int_{2\pi/3}^{4\pi/3} (1 + 2\cos\theta)^2 \, d\theta$

2. $\dfrac{1}{2}\displaystyle\int_{0}^{\pi/2} (1 + 2\cos\theta)^2 \, d\theta$

3. $\displaystyle\int_{2\pi/3}^{4\pi/3} \sqrt{5 + 4\cos\theta} \, d\theta$

4. $\dfrac{1}{2}\displaystyle\int_{0}^{2\pi/3} (1 + 2\cos\theta)^2 \, d\theta$

5. $\displaystyle\int_{0}^{\pi/2} \sqrt{5 + 4\cos\theta} \, d\theta$

6. $\displaystyle\int_{0}^{2\pi/3} \sqrt{5 + 4\cos\theta} \, d\theta$

7. $\dfrac{1}{2}\displaystyle\int_{\pi/2}^{2\pi} (1 + 2\cos\theta)^2 \, d\theta$

8. $\displaystyle\int_{\pi/2}^{2\pi} \sqrt{5 + 4\cos\theta} \, d\theta$

007　10.0 points

Find the arc length of the portion of the graph shown as a solid curve in

of the polar curve

$$r \;=\; 1 - \cos\theta\,.$$

1. arc length $=\; 2$

2. arc length $=\; 2 - \sqrt{2}$

3. arc length $=\; 4$

4. arc length $=\; 2\sqrt{2}$

5. arc length $=\; 2(2 - \sqrt{2})$

6. arc length $=\; \sqrt{2}$